

INTRAOCULAR LENS INSERTION APPARATUS

[Field]

[0001] The embodiments discussed herein relate to an intraocular lens insertion apparatus.

[Background]

[0002] Intraocular lenses are widely used to be replaced with human opacity crystalline lenses in cataract treatments to compensate the optical powers of the lenses. In intraocular lens insertion surgeries for the cataract treatments, an incision (discission cut) which is several millimeters in length is produced at the edge of the cornea or the sclerocornea, the human crystalline lens is crushed and removed by phacoemulsification and aspiration etc. and the intraocular lens is inserted and fixed in the eye using an intraocular lens insertion apparatus, for example. Recently, techniques for supporting the insertion of an intraocular lens into an eyeball of a patient by using an intraocular lens insertion apparatus are proposed (See Patent Literatures 1, 2 and 3).

[Citation List]

[Patent Literature]

[0003]

[PTL 1] JP-A-2014-050484

[PTL 2] JP-A-2008-272257

insertion apparatus generally includes an apparatus body and a pushing member for pushing an intraocular lens. The apparatus body includes a nozzle body 10 and a stage member 12 and the stage lid member 13 which form an accommodating member for accommodating an intraocular lens. In addition, the pushing member for pushing the intraocular lens includes a plunger 30. The stage member 12 is integrally or independently formed on the nozzle body 10. The plunger 30 is inserted into the nozzle body 10. An intraocular lens 2 is set on the stage member 12. The stage member 12 is integrally formed with the stage lid member 13.

[0018] The nozzle body 10 of the intraocular lens insertion apparatus 1 is formed in a tubular shape the cross section of which is a rectangle. An opening formed at one end of the nozzle body 10 which is referred to as a rear end member 10b is larger than an opening formed at the other end of the nozzle body 10 which is referred to as a distal end member 10a. As illustrated in FIG. 1(b), the opening of the distal end member 10a is formed into a bevel. The plunger 30 is inserted into the nozzle body 10 and can be moved to-and-fro in the nozzle body 10.

[0019] In the descriptions hereinafter, the direction extending toward the distal end member 10a from the rear end member 10b of the nozzle body 10 is

distal end member 10a and the incision is determined. After the distal end member 10a of the nozzle body 10 is positioned with respect to the incision, the user pushes the pushing plate member 33 of the plunger 30 toward the distal end of the nozzle body 10. As a result, the distal end of the operating member 31 of the plunger 30 comes into contact with the lens body 2a of the intraocular lens 2 set on the setting surface 12b, and the intraocular lens 2 is guided toward the distal end member 10a by the plunger 30.

[0037] FIGS. 5(a) and 5(b) illustrate the schematic configuration of the plunger 30. A longitudinal length of the plunger 30 is set slightly larger than the longitudinal length of the nozzle body 10. The plunger 30 is formed of: an operating member 31 which is disposed on a distal end side and basically has a columnar shape; and an insertion member 32 which is disposed on a rear end side and basically has a rectangular rod shape. The operating member 31 is configured to include a columnar member 31a having a columnar shape and thin-plate-shaped flat members 31b expanding in the lateral direction from the columnar member 31a.

[0038] A notch member 31c is formed on the distal end portion of the operating member 31. As illustrated in FIG. 5(a), the notch member 31c is formed on the operating member 31 in a groove shape such that the notch member 31c opens upward and penetrates the operating

600a from the upper edge 600h side down to the lower edge 600k side of the backboard 600a. The through-holes 600f function as an example of a detachment prevention mechanism. In addition, concave members 600g through which the hold member 11 of the nozzle body 10 moves is provided between the lateral walls 600b and the baseplate 600c. Further, a connecting member 600e the configuration of which is similar to the configuration of the combination of the plate member 11a and the engaging member 11b is provided for the baseplate 600c.

[0067] FIG. 13(c) schematically illustrates that the intraocular lens insertion apparatus 1 and the operability enhancing member 200 are attached to the attaching member 600. When the intraocular lens insertion apparatus 1 and the operability enhancing member 200 are attached to the attaching member 600, the hold member 11 of the nozzle body 10 is engaged with the concave member 600g. In addition, the flange 200b of the operability enhancing member 200 is engaged with the connecting member 600e. As a result, the hold member 11 and the flange 200b are fixed to the attaching member 600 by the baseplate 600c and the connecting member 600e. Additionally, when the user tries to detach the hold member 11 or the flange 200b from the attaching member 600 after the hold member 11 and the flange 200b are once fixed to the attaching member 600, a bending rupture of the part including through-holes 600f is caused by the

attaching member 700, the hold member 11 of the nozzle body 10 is engaged with the concave member 600g. In addition, the flange 200b of the operability enhancing member 800 is engaged with the connecting member 700e. In this case, the protrusion 810 of the operability enhancing member 800 is engaged with the concave member 710. As a result, the hold member 11 and the flange 200b are fixed to the attaching member 700 by the baseplate 600c and the connecting member 700e. Additionally, the engagement between the protrusion 810 and the concave member 710 can decrease the possibility that the operability enhancing member 800 is detached from the attaching member 700.

[0070] In the present variation, the operability enhancing member 800 can be replaced with an operability enhancing member 900 as illustrated in FIGS. 15(a) and 15(b). The operability enhancing member 900 includes a plate spring 910 which can be engaged with the concave member 710 instead of the protrusion 810 of the operability enhancing member 800. In this case, as illustrated in FIGS. 15(a) and 15(b), the engagement between the plate spring 910 and the concave member 710 can decrease the possibility that the operability enhancing member 900 is detached from the attaching member 700.

[0071] (Variation 5)

FIGS. 16(a), 16(b) and 16(c) schematically

intraocular lens insertion apparatus 1500 according to the variation 7. The configuration of the intraocular lens insertion apparatus 1500 is similar to the configuration of the intraocular lens insertion apparatus 1 as described above. A screw hole 1510e into which a screw 1600 is screwed is provided for the nozzle body 10. As illustrated in FIGS. 18(a) and 18(b), when the screw 1600 is screwed into the screw hole 1510e, the tip of the screw 1600 comes into contact with the plunger 30. As a result, when an operability enhancing member (not illustrated) is attached to the intraocular lens insertion 1500, the screw 1600 prevents undesirable movements of the plunger 30 with respect to the nozzle body 10 caused by the user. In the present variation, when the screw 1600 is unscrewed from the screw hole 1510e after the operability enhancing member is attached to the intraocular lens insertion apparatus 1500, the user can use the intraocular lens insertion apparatus 1500.

[0077] A notch which is engaged with the engaging hole 10e can be provided for the plunger 30 instead of the configuration that the screw 1600 is used to prevent undesirable movements of the plunger 30. Alternatively, one end of a tape is attached to the plunger 30, the tape is configured to extend through the engaging hole 10e, and the other end of the tape is located outside the nozzle body 10. In this case, the user pulls the tape

10. The intraocular lens insertion apparatus according to any one of claims 1 to 6, wherein the operability enhancing member comprises a tube member which extends from the rear end of the hook member in a direction opposite to the direction of the movement of the plunger to cover the plunger.

11. The intraocular lens insertion apparatus according to any one of claims 1 to 6, wherein the operability enhancing member comprises a motion conversion device which is configured to convert a rotational motion of a rotating member rotated by the user to a linear motion and which is configured to transmit the linear motion to the plunger to move in the apparatus body.

12. The intraocular lens insertion apparatus according to any one of claims 1 to 6 and 11, wherein the operability enhancing member comprises a driving source configured to move the plunger.

13. The intraocular lens insertion apparatus according to any one of claims 1 to 12, wherein the intraocular lens is housed in the housing member before the intraocular lens insertion apparatus is distributed.